

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A vertical-cavity device comprising:

(a) a chip comprising an active semiconductor layer for providing configured to provide optical gain;

(b) a first mirror arranged on a first side of the active layer;

(c) a second mirror arranged on a second side of the active layer, opposite to the first mirror, and forming with at least the first mirror an optically resonant cavity that passes through the active layer in a direction out of the plane of the active layer; and

(d) a heatspreader for removing heat from the active layer, the heatspreader being arranged inside the cavity and having a first surface adjacent to the chip and a second surface opposite to the first surface, the heatspreader being transparent to light of wavelengths in an operating bandwidth of the device[[;]] and having at least one characterised in that, in addition to removing heat from the active layer, the heatspreader also has one or more further selected property that has a further selected effect on light output from the device.

2. (Original) A device as claimed in claim 1, in which the heatspreader is birefringent and the further selected effect is on the polarisation of the output light.

3. (Original) A device as claimed in claim 2, in which the difference in between the refractive indices of the

heatspreader's slow and fast polarisation axes is greater than 0.01.

4. (Currently amended) A device as claimed in claim 2 ~~or claim 3~~, comprising a further element that limits the output light to a linear polarisation.

5. (Currently amended) A device as claimed in ~~any of claims 1 to 4~~ claim 1, in which the heatspreader has a nonlinear optical response.

6. (Currently amended) A device as claimed in ~~any preceding~~ claim 1, in which the shape of the heatspreader provides the further selected effect.

7. (Original) A device as claimed in claim 6, in which the second surface of the heatspreader is curved or includes a curved structure.

8. (Currently amended) A device as claimed in ~~any preceding~~ claim 1, in which the heatspreader focuses or defocuses the output light.

9. (Currently amended) A device as claimed in ~~any preceding~~ claim 1, in which the heatspreader focuses pump light into the active layer.

10. (Currently amended) A device as claimed in ~~any preceding~~ claim 1, in which the further selected effect is on light generated in the active semiconductor layer at a fundamental frequency of the device.

11. (Currently amended) A device as claimed in ~~any preceding~~ claim 1, in which the selected property of the

heatspreader has been selected to affect the spectrum of the output light.

12. (Original) A device as claimed in claim 11, in which the heatspreader has a refractive index that has been selected to provide substantially no refractive index step at the first surface.

13. (Original) A device as claimed in claim 12, in which reflectance at the first surface of the heatspreader is less than 5%.

14. (Original) A device as claimed in claim 10, in which the heatspreader has a refractive index that has been selected to provide a refractive index step at the first surface.

15. (Currently amended) A device as claimed in any preceding claim 1, in which the second surface of the heatspreader is at an angle to the layers of the chip.

16. (Currently amended) A device as claimed in any preceding claim 1, in which the heatspreader has a shape selected to provide control of a spatial mode of the output light.

17. (Original) A device as claimed in claim 16, in which the heatspreader focuses or defocuses intracavity light.

18. (Original) A device as claimed in claim 17, in which the second mirror is flat.

19. (Original) A device as claimed in claim 18 in which the second mirror is a MEMS mirror.

20. (Currently amended) A device as claimed in ~~any~~ preceding claim 1, in which the second surface of the heatspreader has a dielectric coating.

21. (Original) A device as claimed in claim 20, in which the dielectric coating is an anti-reflection coating.

22. (Currently amended) A device as claimed in claim 20, in which the dielectric coating is a mirror coating and [[it]] forms the second mirror.

23. (Currently amended) A device as claimed in ~~any~~ preceding claim 1, in which the heatspreader has a thickness of less than 1.5 mm.

24. (Currently amended) A device as claimed in ~~any~~ preceding claim 1, in which the heatspreader is [[also]] a loss modulator.

25. (Currently amended) A method of manufacturing a vertical-cavity device, comprising:

(a) fabricating a chip comprising an active semiconductor layer for providing optical gain;

(b) providing a first mirror on a first side of the active layer;

(c) providing a second mirror on a second side of the active layer, opposite to the first mirror, which forms with at least the first mirror an optically resonant cavity that passes through the active layer in a direction out of the plane of the active layer;

(d) providing in the cavity a heatspreader for removing heat from the active layer, the heatspreader having a first surface adjacent to the chip and a second surface opposite to the first surface, the heatspreader being transparent to

light of wavelengths in the operating bandwidth of the device; and

~~characterised in that the method also includes the step of~~

~~(e) selecting at least one or more property of the heatspreader to have a selected effect on the output light, in addition to the effects effect of removing heat from the active layer.~~

26. (Original) A method as claimed in claim 25, including the step of forming the second surface of the heatspreader to be curved or to include a curved structure.

27. (Original) A method as claimed in claim 26, in which the curved surface is formed by polishing.

28. (Original) A method as claimed in claim 26, in which the curved surface or the curved structure is formed by etching.

29. (Currently amended) A device manufactured by a method according to ~~any of claims 25 to 28~~ claim 25.

30. (Currently amended) An amplifier or laser including a source of pump light comprising a device according to ~~any of claims 1 to 24~~ claim 1.

31. (Original) An amplifier or laser as claimed in claim 30 that is a Raman amplifier.

32. (Currently amended) A vertical cavity device comprising:

(a) a chip comprising an active semiconductor layer for providing optical gain;

(b) a first mirror arranged on a first side of the active layer suitable for forming with at least a second mirror arranged on a second side of the active layer,

opposite to the first mirror, an optically resonant cavity that passes through the active layer in a direction out of the plane of the active layer; and

(c) a heatspreader for removing heat from the active layer, having a first surface adjacent to the active layer and a second surface opposite to the first surface, the heatspreader being transparent to light of wavelengths in an operating bandwidth of the device[[]] and,

~~characterised in that~~, in addition to removing heat from the active layer, ~~the heatspreader also has one or more at least one~~ further selected property that has a further selected effect on light output from the device.